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ABSTRACT

This unit provides secondary school students with methods for comparison shopping of savings institutions. It contains both student materials and teacher's guide and is designed for individualized instruction. Approximate time for the unit is six hours. Activities include analyzing cartoons, defining the terms "savings" and "interest," listing long-term and short-term reasons for saving money, surveying advertisements of savings and loan institutions, and calculating simple and compound interest through algebraic formulas. The activities are presented in dialogue form with cartoon illustrations. The teacher's guide includes reproducible pre- and posttests and worksheets with keys and lists materials needed. (KC)

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How Dollars Make Cents $

TEACHER'S GUIDE

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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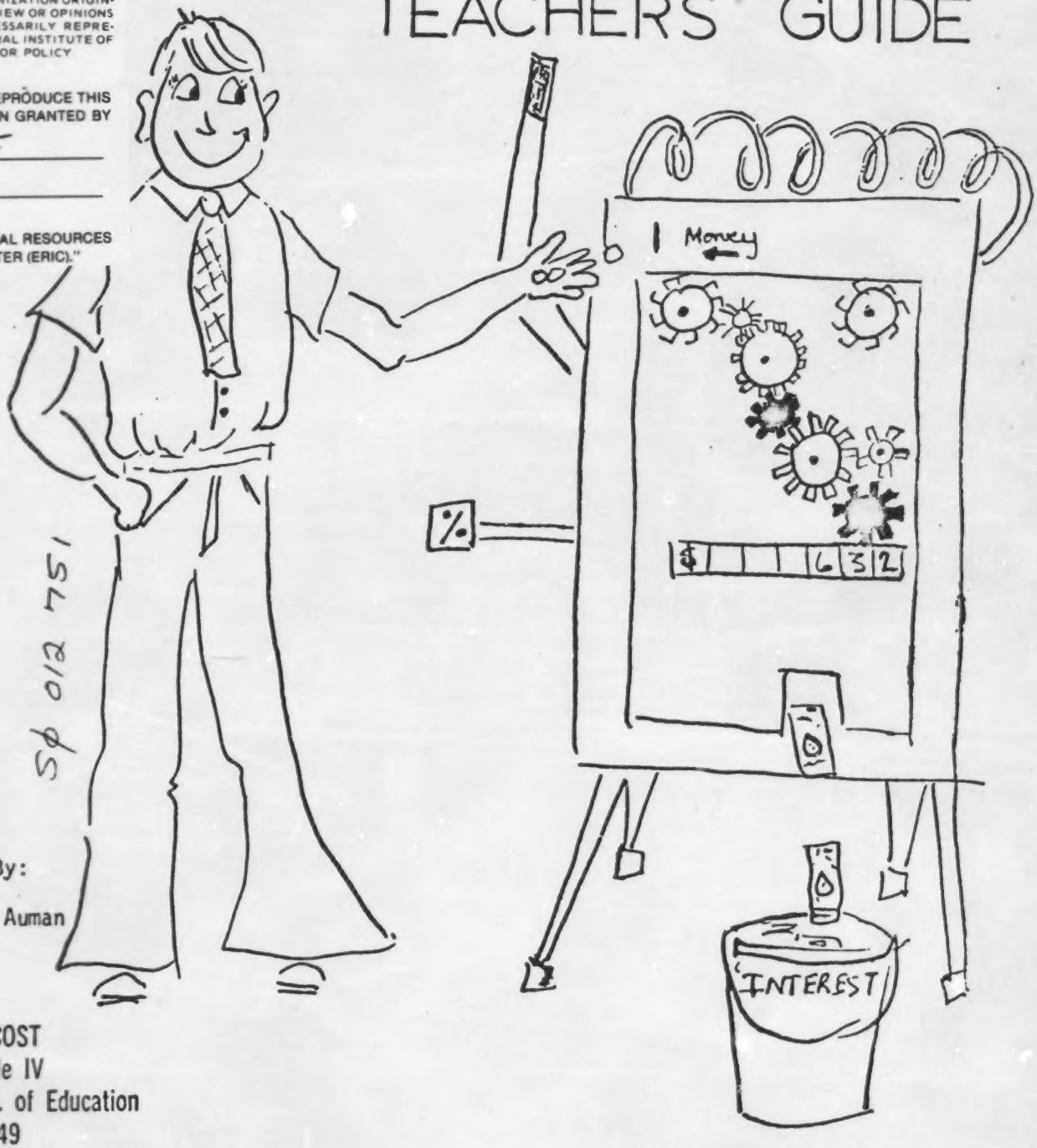

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for

Project COST
ESEA Title IV
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Project COST or Consumer Operations Survival Training was a curriculum planning and development effort to produce capsules for kindergarten through twelfth grade including special education. The capsules were designed to integrate consumer education into the existing curriculum using an individualized approach to instruction.

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PACKAGE RESUME FORM

PUBLICATION DATE July, 1979

LEVEL/SUBJECT Secondary Algebra I

TITLE How Dollars Make Cents

AUTHOR L. Charles Auman

ABSTRACT:

This capsule is designed to teach students to solve algebraic problems involving simple interest. It is self-contained, meaning the student may complete activities with no outside resources except the yellow pages, newspapers and a dictionary. With remediation in simple interest problems, it gives the student enough tools to do simple comparison shopping of savings institutions.

This capsule is designed to fit into the Algebra I curriculum. It would be appropriate for any post Algebra I student.

Students should be able to complete the activities in this capsule within 4 to 6 hours of instructional time.

PRE- AND POST-TEST GENERAL INSTRUCTIONS

Both tests are multiple choice with each test having five problems. Students are, of course, to show their work. The first two questions are designed to test whether the student needs to do Section II or not. Not only should the answer be correct, but the work should be done correctly also.

MATERIALS NEEDED

dictionary
newspapers or magazines
the yellow pages
information on current interest rates

These materials will be used by the student to complete the activities of this capsule. You may find that some of the information needed for the activities can be supplied by the teacher.

GENERAL INSTRUCTIONS

Activity 2 on page 11 requires a dictionary. Not all students will be doing this activity at the same time, so each student will not need his own dictionary. You can give the definitions yourself if you do not wish to provide dictionaries.

Activity 4 uses newspapers with ads from financial institutions. You may provide newspapers or have students bring them from home. You may choose to give the information to the student.

Activity 5 requires the student to use the Yellow Pages of the telephone directory. You may wish to give the students the needed information if Yellow Pages are not available.

The Quest activity requires the student to watch tv or listen to the radio. This is to be done at home.

Activity 2 page 21 provides an opportunityto use problems in your textbook. So you might want to have an assignment sheet ready for your students.

In Section II you might allow students to use calculators, though it is not necessary. It mentions logarithms only as an introduction to the word.

Quest Activity Page 30 is a comparative study of savings accounts.

Computer practice could easily be used with this capsule, though at this time there are no programs available with this capsule. If you have access to a computer, you may write your own program, or you may already have a program that corresponds to this capsule.

How Dollars Make Cents

PRE-TEST

Name Key Date _____

1. What is the simple interest earned on $700 in a savings account for 2 years paying an interest rate of 7%?

   a. $14

   b. $101.43

   (c.) $98 $700 \times .07 \times 2 = 98$

   d. $49

2. What is the interest earned on $250 for 2 years and 6 months in a savings account paying 6½% interest?

   (a.) $40.63 $250 \times .065 \times 2.5 = 40.63$

   b. $16.25

   c. $32.50

   d. $25.25

3. Joan earned $17 interest on $200 that she had saved for one year. What rate of interest was her money earning?

   a. 1.7%

   (b.) 8.5% $200 \times r = 17$

   c. 34%

   d. 11.76%

4. Compounding interest pays _____ a simple interest account.

   a. the same as

   (b.) more than

   c. less than

How Dollars Make Cents
Pre-Test (con't)

5. How much money will be in a savings account 2 years from now if it pays 6% interest compounded semiannually and has $100 in it now?

a. $12

b. $106

c. $112

(d.) $112.55

$A = P(1 + \frac{r}{n})^{tn}$

$A = 100(1 + \frac{.06}{2})^{4}$

$A = 100(1.03)^4$

$A = 100(1.1255)$

$A = \$112.55$

6. Which of the follwoing is <u>not</u> a reason for saving money in a savings account?

a. accumulate money for an expensive item

b. have your money make money

(c.) to buy something you cannot afford

d. accumulate money for unexpected expenses

7. John has $100 in a savings account that pays 8% interest compounded semiannually. How long will it take to double John's money?

a. 8 years

b. 5 years

c. 12½ years

(d.) 10 years

$200 = 100(1 + \frac{.08}{2})^{2t}$

$2 = (1.04)^{2t}$

$\log 2 = 2t \log 1.04$

$\frac{\log 2}{2 \log 1.04} = t$

$i = prt$

$100 \times .08 \times \frac{1}{2} = 104$

$104 \times .08 \times \frac{1}{2} = 108.16$

$108.16 \times .08 \times \frac{1}{2} = 112.49$

etc.

8. Sally put $350 in her savings account 3 years ago. If her account pays 7% simple interest, how much money is in her account now?

(a.) $423.50

b. $300

c. $73

d. $374.50

$350(.07)(3) = 73.5$

$350(1 + .07)^3 = 428.77$

How Dollars Make Cents

PO$T-TEST

Name Key Date _____

1. What is the simple interest earned on $800 in a savings account for three years that pays an interest rate of 6%?

   (a.) $144 — 800(.06)(3)

   b. $48

   c. $24

   d. $18

2. What is the interest earned on $450 for 3 years and 3 months in a savings account paying 7 3/4% interest?

   a. $94.50

   b. $34.88

   (c.) $113.34 — 450(3.25)(.0775)

   d. $116.13

3. If Jim earned $13 interest on $100 that he had saved for 2 years, what rate of interest was his money earning?

   a. 26%

   b. 3.8%

   c. 6% — 13 = 100(2)(r)

   (d.) 6.5%

4. How much money will be in a savings account 1 year and 6 months from now if it pays 6% interest compounded semiannually and has $250 in it now?

   a. $222.50 — 250(.06)(½) = 7.5) 6 mo.

   (b.) $273.18 — 257.5(.03) = 7.73) 1½ yr.

   c. $22.50 — 265.23(.03) = 7.96

   d. $73.18 — 273.19

How Dollars Make Cents
Post-Test (con't)

5. Using the formula find the amount earned on $175 in a savings account for 1 year, paying 7½% interest compounded quarterly.

(a.) $188.49 $175\left(1+\frac{.075}{4}\right)^4$

b. $188.13 $175(1.0191)^4$

c. $13.13 $175(1.0786167)$

d. $13.49 $\$188.75$

6. Give three reasons for saving money in a savings account.

a.

b.

c.

7. If John has $300 in his account now, when will he have $1000 in the account if it pays 9% interest compounded quarterly?

a. 8.4 years $1000 = 300\left(1+\frac{.09}{4}\right)^{4t}$

(b.) 13.5 years $\frac{1000}{300} = (1.0225)^{4t}$

c. 20.5 years $\log 3.333 = 4t \log 1.0225$

d. 37 years $\frac{\log 3.333}{4 \log 1.025} = t = \frac{.5228}{4(.0096)} = 13.61$

8. If Joan earned $17 interest on $200 that she had saved for 1year, what rate of interest was her money earning?

(a.) 8.5%

b. 1.7%

c. 11.76%

d. 34%

How Dollars Make Cents
Post-Test (con't)

9. What is the simple interest on $700 in a savings account for 2 years paying an interest rate of 7%?

   a. $101.43

   b. $14

   (c.) $98

   d. $49

10. Which of the following would earn the most interest?

    a. $100 at 5% interest compounded monthly $A = 100\left(1 + \frac{.05}{12}\right)^{12}$

    b. $100 at 5¼% simple interest $A = 100(.0525)$

    (c.) $50 at 11% simple interest $A = 50(.11)$

WORKSHEET 1

Name Key Date _____

Work the following problems filling in the blanks.

Find the interest earned
on $800 in a savings account
for 2 years at 6% interest.

i = (800) (.06) (2)

800
x .06
48.00
x 2
96

i = prt

p = 800

r = .06

t = 2

i = prt

principle
x rate
interest for one year
x time
total interest earned

$96 was earned on the $800 in the account for 2 years.

WORKSHEET 2

NAME Key DATE _____

Work the following problems showing all your work. Put the answer in the blank preceeding the number.

$80 1. Betty has had $500 in her account for 2 years. What interest has she earned if the bank pays 8 % interest?

$500(.08)(2)$

$750 2. Find Henry's interest on $2500 for 8 years at 3 3/4% interest.

$2500(.0375)(8)$

$3.48 3. Sue has had her $580 in her savings account for 73 days at 3% interest. Find the interest.

$580(.03)\left(\frac{73}{365}\right)$

$48.75 4. Mr. Jones has six $500 bonds, each earning 3¼% interest. How much interest does he get every 6 months?

$6(500)(.0325)(.5) =$

$19.50 5. Find the interst on Joe's savings account in which he has $624 for 5 months at 7½% interest.

$(624)\left(\frac{5}{12}\right)(.075)$

WORKSHEET 3

Name Key Date _____

Solve the following problems by finding the annual rate of interest.

6% 1. June had $600 invested for 4 years that earned $144.

$$144 = 600(r)(4)$$

$$\frac{144}{2400} = r$$

2% 2. Bill had $860 invested for 9 years that earned $154.80.

$$154.80 = 860(r)(9)$$

$$\frac{154.8}{860(9)} = r$$

WORKSHEET 4

Name Key Date _____

Work the following problems. Show your work.

4200@6% 4800@3% 1. John invested $9000 in two savings accounts, one paying 6%, the other 3%. Each year he received $396. How much was invested at each rate?

6%	3%
x	$9000 - x$

$$396 = .06x + .03(9000 - x)$$
$$396 = .06x + 27 - .03x$$
$$126 = .03x$$
$$4200 = x$$

3085.71 2. Jane has twice as much money in a savings account paying 5% interest as she does in one paying 4% interest. How much is invested if she expects an interest check of $144 at the end of the year?

4%	5%
x	$2x$

$$.04x + .05(2x) = 144$$
$$.04x + .1x = 144$$
$$.14x = 144$$
$$x = 1028.57$$

9000@5% 12000@5% 3. Dr. Smith has $3000 more invested at 4% that she does at 5%, and the interest she earns on the amount invested at 4% is $30 per year greater than the annual interest she earns on the money invested at 5%. How much does Dr. Smith have invested at each rate?

4%	5%
$3000 + x$	x

$$.04(3000 + x) = .05x + 30$$
$$120 + .04x = .05x + 30$$
$$90 = .01x$$

WORKSHEET 5

Name Keys Date _____

Find the amount of interest Thirfty Sally earned on $200 in one year at 5% interest.

$10 1. Compounded yearly (simple interest)

$10.13 2. Compounded semiannually.

$10.18 3. Compounded quarterly.

$1023 4. Compounded monthly.

WORKSHEET 6

Name Key Date _____

Work the following problems putting the answer in the blank before the number of the problem. Show your work.

(a) $207.10 1. If you save $200 at 7% interest compounded monthly, how much will you have in 6 months? (b) in one year?

(b) $214.46

(a) $253.27 2. If you save $245 at 6 3/4% compounded semiannually, how much money will you have in 6 months? (b) in one year? (c) in five years?

(b) $261.82

(c) $ 341.45

$146.66 3. You put $100 in the bank 3 years ago at 6% interest compounded yearly. If the interest changed today to 7% compounded quarterly, how much money will you have in 3 years?

APPENDIX

This appendix contains copies of all worksheets and assessments. These copies may be used to make your own classroom quantity copies. To use, unstaple the sides of the teacher's guide and remove the worksheet and assessment pages. Restaple the remaining pages of the teacher's guide.

How Dollars Make Cents

PRE-TEST

Name _____ Date _____

1. What is the simple interest earned on $700 in a savings account for 2 years paying an interest rate of 7%?

   a. $14

   b. $101.43

   c. $98

   d. $49

2. What is the interest earned on $250 for 2 years and 6 months in a savings account paying 6½% interest?

   a. $40.63

   b. $16.25

   c. $32.50

   d. $25.25

3. Joan earned $17 interest on $200 that she had saved for one year. What rate of interest was her money earning?

   a. 1.7%

   b. 8.5%

   c. 34%

   d. 11.76%

4. Compounding interest pays _____ a simple interest account.

   a. the same as

   b. more than

   c. less than

How Dollars Make Cents
Pre-Test (con't)

5. How much money will be in a savings account 2 years from now if it pays 6% interest compounded semiannually and has $100 in it now?

   a. $12

   b. $106

   c. $112

   d. $112.55

6. Which of the follwoing is <u>not</u> a reason for saving money in a savings account?

   a. accumulate money for an expensive item

   b. have your money make money

   c. to buy something you cannot afford

   d. accumulate money for unexpected expenses

7. John has $100 in a savings account that pays 8% interest compounded semiannually. How long will it take to double John's money?

   a. 8 years

   b. 5 years

   c. 12½ years

   d. 10 years

8. Sally put $350 in her savings account 3 years ago. If her account pays 7% simple interest, how much money is in her account now?

   a. $423.50

   b. $300

   c. $73

   d. $374.50

How Dollars Make Cents

POST-TEST

Name _____ Date _____

1. What is the simple interest earned on $800 in a savings account for three years that pays an interest rate of 6%?

   a. $144

   b. $48

   c. $24

   d. $18

2. What is the interest earned on $450 for 3 years and 3 months in a savings account paying 7 3/4% interest?

   a. $94.50

   b. $34.88

   c. $113.34

   d. $116.13

3. If Jim earned $13 interest on $100 that he had saved for 2 years, what rate of interest was his money earning?

   a. 26%

   b. 3.8%

   c. 6%

   d. 6.5%

4. How much money will be in a savings account 1 year and 6 months from now if it pays 6% interest compounded semiannually and has $250 in it now?

   a. $222.50

   b. $273.18

   c. $22.50

   d. $73.18

How Dollars Make Cents
Post-Test (con't)

5. Using the formula find the amount earned on $175 in a savings account for 1 year, paying 7½% interest compounded quarterly.

   a. $188.49

   b. $188.13

   c. $13.13

   d. $13.49

6. Give three reasons for saving money in a savings account.

   a.

   b.

   c.

7. If John has $300 in his account now, when will he have $1000 in the account if it pays 9% interest compounded quarterly?

   a. 8.4 years

   b. 10.5 years

   c. 20.5 years

   d. 37 years

8. If Joan earned $17 interest on $200 that she had saved for 1year, what rate of interest was her money earning?

   a. 8.5%

   b. 1.7%

   c. 11.76%

   d. 34%

How Dollars Make Cents
Post-Test (con't)

9. What is the simple interest on $700 in a savings account for 2 years paying an interest rate of 7%?

   a. $101.43

   b. $14

   c. $98

   d. $49

10. Which of the following would earn the most interest?

   a. $100 at 5% interest compounded monthly

   b. $100 at 5¼% simple interest

   c. $50 at 11% simple interest

RECORD SHEET

Name _____ Date _____

ACTIVITY	SCORE	DATE COMPLETED
Pre-Test		
Section I Activities		
1.		
2.		
3.		
4.		
Section II Activities		
1. Worksheet 1		
2. Worksheet 2		
1. Worksheet 3		
2. Additional Problems		
1. Worksheet 4		
2. Additional Problems		
Section III Activities		
1. Worksheet 5		
1. Worksheet 6		
Post-Test		

WORKSHEET 1

Name _____ Date _____

Work the following problems filling in the blanks.

Find the interest earned
on $800 in a savings account
for 2 years at 6% interest.

i = (_____) (_____) (_____)

_____

X_____

_____

X_____

_____

i = _____

p = _____

r = _____

t = _____

i = prt

principle
x rate
interest for one year
x time
total interest earned

_____ was earned on the $800 in the account for 2 years.

WORKSHEET 2

NAME _____ DATE _____

Work the following problems showing all your work. Put the answer in the blank preceeding the number.

_____ 1. Betty has had $500 in her account for 2 years. What interest has she earned if the bank pays 8 % interest?

_____ 2. Find Henry's interest on $2500 for 8 years at 3 3/4% interest.

_____ 3. Sue has had her $580 in her savings account for 73 days at 3% interest. Find the interest.

_____ 4. Mr. Jones has six $500 bonds, each earning 3¼% interest. How much interest does he get every 6 months?

_____ 5. Find the interst on Joe's savings account in which he has $624 for 5 months at 7½% interest.

WORKSHEET 3

Name _____ Date _____

Solve the following problems by finding the annual rate of interest.

_____ 1. June had $600 invested for 4 years that earned $144.

_____ 2. Bill had $860 invested for 9 years that earned $154.80.

WORKSHEET 4

Name _____ Date _____

Work the following problems. Show your work.

_____ 1. John invested $9000 in two savings accounts, one paying 6%, the other 3%. Each year he received $396. How much was invested at each rate?

_____ 2. Jane has twice as much money in a savings account paying 5% interest as she does in one paying 4% interest. How much is invested if she expects an interest check of $144 at the end of the year?

_____ 3. Dr. Smith has $3000 more invested at 4% that she does at 5%, and the interest she earns on the amount invested at 4% is $30 per year greater than the annual interest she earns on the money invested at 5%. How much does Dr. Smith have invested at each rate?

WORKSHEET 5

Name _____ Date _____

Find the amount of interest Thirfty Sally earned on $200 in one year at 5% interest.

_____ 1. Compounded yearly (simple interest)

_____ 2. Compounded semiannually.

_____ 3. Compounded quarterly.

_____ 4. Compounded monthly.

WORKSHEET 6

Name _____ Date _____

Work the following problems putting the answer in the blank before the number of the problem. Show your work.

(a) _____ 1. If you save $200 at 7% interest compounded monthly, how much will you have in 6 months? (b) in one year?

(b) _____

(a) _____ 2. If you save $245 at 6 3/4% compounded semiannually, how much money will you have in 6 months? (b) in one year? (c) in five years?

(b) _____

(c) _____

_____ 3. You put $100 in the bank 3 years ago at 6% interest compounded yearly. If the interest changed today to 7% compounded quarterly, how much money will you have in 3 years?

SURVEY FORM

bank or savings institution	rate of interest	interest earned on $100 for 1 yr.	Does your family do business there?	How far is it from your home?

DIRECTIONS: (1) Find the rate of interest paid on passbook accounts. (2) Use the simple interest formula to find the interest on $100 for 1 year. (3) Answer the questions in columns 4 & 5.

QUESTIONS:

1. Which bank or savings institution is closer to your home?
2. Which one pays the most interest?
3. Are the answers to 1 and 2 the same?
4. Does your family bank or do business with either of the ones in 1 or 2?
5. In which bank would you like to have a savings account? Why?

Use the back of this page to answer the questions.

Name _____ Date _____

COMMERCIAL ANALYSIS

Answer the following questions in reference to a television or radio commercial pertaining to a saving institution.

1. What is the name of the bank or institution? _____

2. Where is it located? (city or part of the city) _____

3. What services of the business did it advertise? _____

_____

4. Did the commercial appeal to you. _____

5. Who did they want to do business with? or Who did they direct the commercial towards? _____

6. Would you be inclined to do business with this company if it were convenient?

_____

7. Would you consider this an expensively done commercial or a low budget commercial? _____

8. What suggestions would you have to make the commercial better? _____

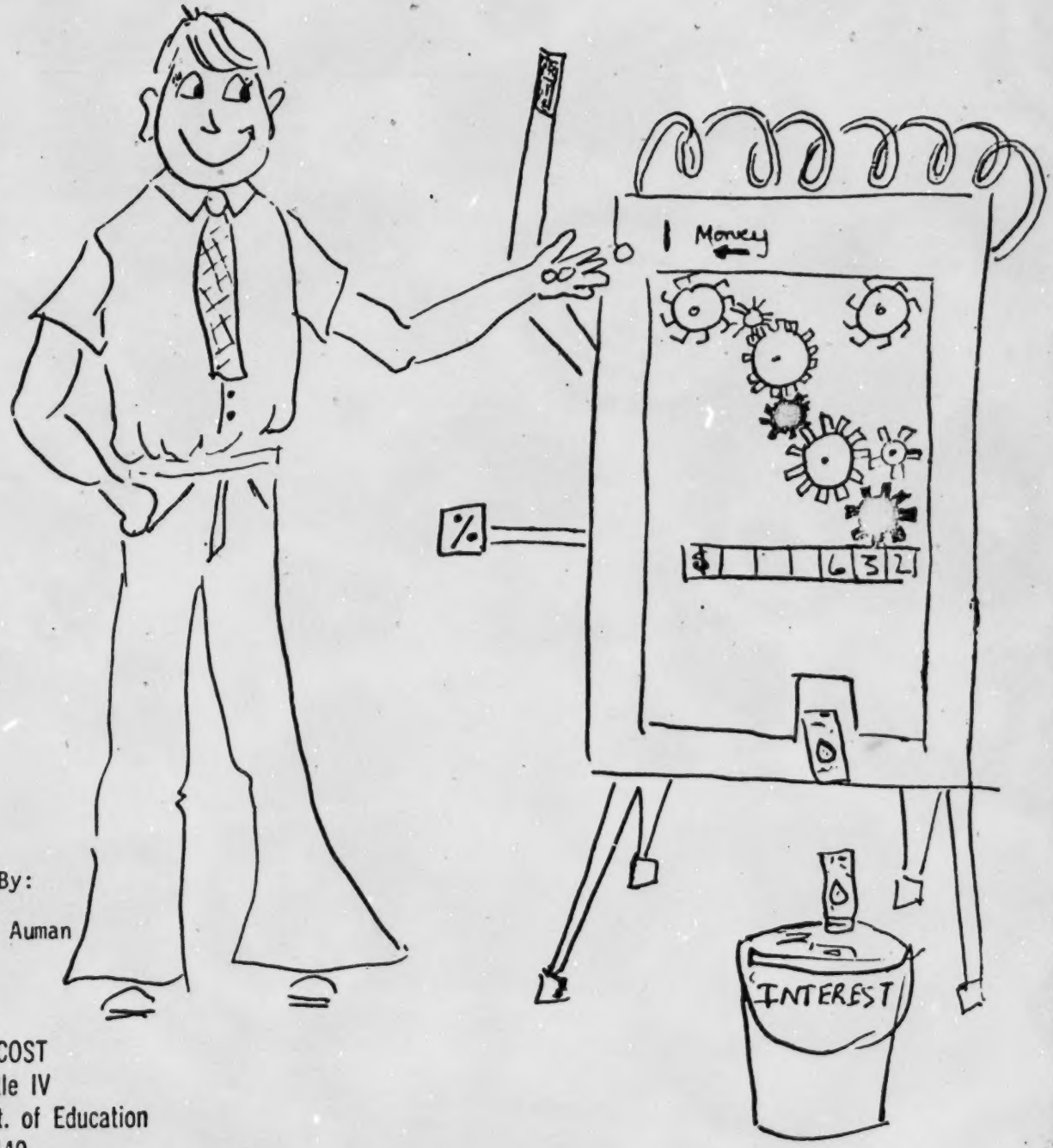
_____

EXTRA:

9. Try making a commercial for one of the banks or savings institutions. It could be a newspaper, magazine, radio, television, or bulletin board advertisement.

How Dollars Make Cents $

Student Material



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Illustrated By:
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OBJECTIVES

You and I both have some reasons to save now. I want to buy some albums for my stereo. I would also like to open a savings account. You might like to open one too. We should learn how much interest a savings account might earn.

That's a good idea. Simple interest is important to learn. It will help you plan for your future purchases. When you complete this section you will be able to:

1. Apply computation skills in using the formula i=prt in finding simple interest.

2. Analyze every day simple interest problems to find the rate, principal, or time to enable you to solve your interest problems.

INTRODUCTION

This capsule is a self-paced learning experience. That means that you will work through it at your own speed. You will be working on your own. You do not have to wait for your teacher to tell you to go on.

Your teacher is ready to help you if you need help, but the directions should be clear. If the directions say to get something from across the room, go get it. Your teacher may have some special directions before you begin the capsule, otherwise follow the directions explicitly (that means exactly).

Now begin the capsule!

Introducing the Capsule

Hello. I'm Business Bob. I know about interest and saving money. I even have some money making more money in my savings account. What this capsule is trying to do is help you do the same by understanding interest and learning how to figure interest.

Hi! I'm Thrifty Sally. I have a difficult time saving money and I don't know what interest is. That's why I am going to do this capsule. I want to learn about interest.

Who cares? I'm Hard Luck Sam and I'm going out to get something to drink! Who cares about interest anyway?

OBJECTIVES

When you finish this capsule you will be smarter than Business Bob, Thrifty Sally or Hard Luck Sam are now. You will be able to:

- identify reasons for saving money.
- apply computation skills in using the formula i=prt in finding simple interest.
- analyze everyday simple interest problems to find the rate, principal or time to enable you to solve your own interest problems.
- apply computational skills and the formula $A=P(1+\frac{r}{n})^{nt}$ to find the balance after interest is compounded.

Do all of the activities when you get to them. Quest activities are there if you want to do additional work. They will really help you to understand interest.

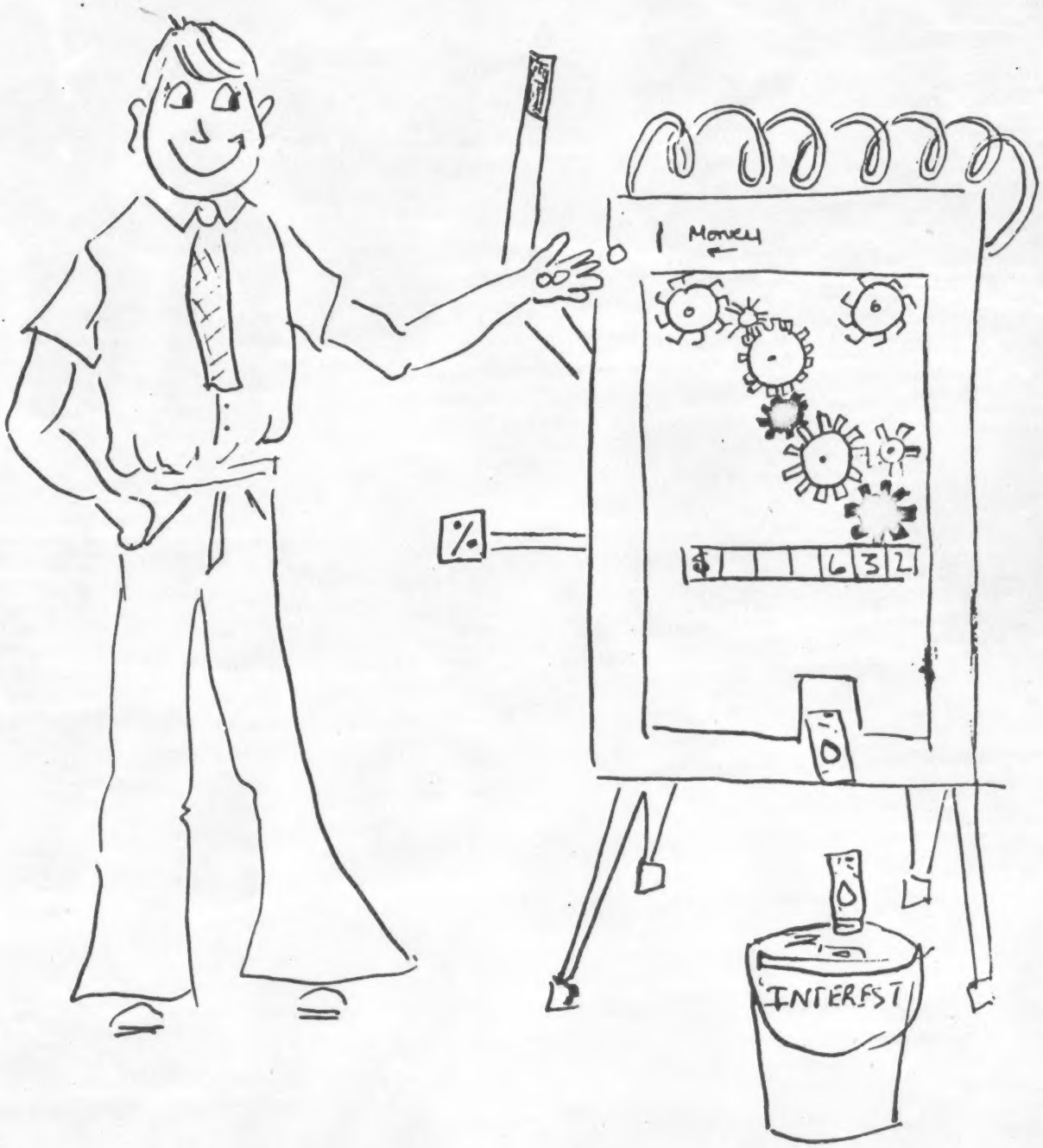
I need to do the entire capsule, but some of you may not. Let's try some different problems to see what you already know about saving money and interest.

You should take the Pre-Test in order to find out how much you know about the material covered in this capsule. If you already know some of the information, you will be able to skip over that part. Do the Pre-Test found in your work packet, then hand it in to your teacher when you have finished.

While you are waiting for your teacher to check your Pre-Test, go on to Section I. Everyone will do it.

SECTION I

SAVING



As you know I have trouble saving. This section may help all of us with this problem. When you finish this section you will be able to identify reasons for saving money.

Look at the cartoon at the top of the page. Does Sam have a problem? Will Sam ever be able to buy the record album? Maybe. If he is lucky. If he had a plan for getting the money to buy the album perhaps he could get it sooner.

Sally has a plan for getting money for the album. By putting a little money in her bank each week, she will soon have the money for the record.

Three weeks later Sally has not saved enough money to buy the record. She wonders how she can save the money faster.

While in the music store, Sally runs into Bob who is buying a record album.

Sally: "Bob, how do you always seem to have enough money to buy records?"

Bob: "Well, I do save money from my allowance."

Sally: "I do too, but it seems to take forever to get enough money."

Bob: "Don't you save regularly?"

Sally: "Only when I want something special."

Bob: "I put the same amount in my savings account each week."

Sally: "You mean in a bank?"

Bob: "Yes."

Sally: "Isn't it difficult to get your money out?"

Bob: "Not very, and the interest is worth it."

Sally: "What's interest?"

Bob: "Interest? It's the money a bank pays you for the using your money. Kind of like renting a house. The bank pays you for the use of your money, and you pay rent for the use of the house."

Sally: "Does it pay very much?"

Bob: "It doesn't seem like much, but it does add up. I have $100 in my savings account and I get about $6 a year.

Sally: "That's not a get-rich-quick-scheme."

Bob: "No, but I've been saving for a few years, and now if I want something special I don't have to wait for it. That is, if it doesn't cost too much."

Sally: "Can you explain to me more about saving and savings accounts?"

Bob: "I would if I had time, but I have to leave now. Why don't you do the activities on the next page? They will help some. I'll talk to you tomorrow. OK?"

Sally: "OK, Bye."

Go to the next page and work through these activities like Sally did.

ACTIVITIES

Do all of the following activities:

1. On a sheet of paper write your own definition of saving and interest, or draw an illustration.

2. Look up savings and interest in the dictionary and compare the dictionary definitions to your definitions. Be sure to use the definitions in the dictionary that apply to money.

3. On a sheet of paper do the following:

   a. List 6 reasons for saving money. If not reasons, things you want to buy but do not have the money for right now.

   b. Label the long term reasons with an "L" (those longer than one year) and the short term reasons with a "S" (those less than one year).

   c. Compare your reasons (b) with the reasons of others in your class that are doing the capsule.

   d. Do they have more long term reasons than you?

   e. Do you have a savings account? If yes, what interest rate does it pay?

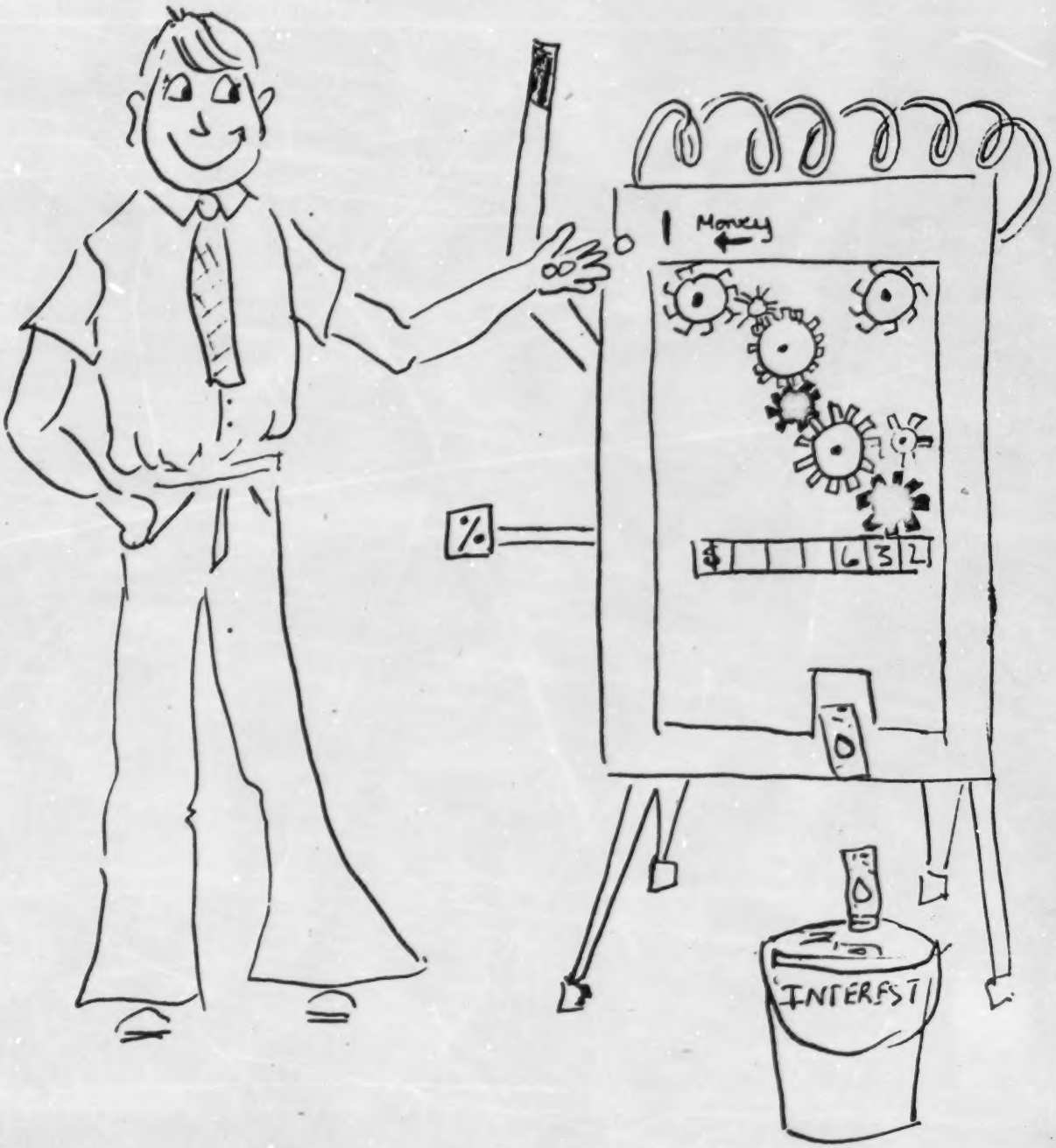
4. Look in the newspaper for ads of savings institutions (banks, saving & loan companies and credit unions). Using the survey form in your work packet, write down all the information in the ad that is asked for in the survey. The survey forms will be used later, so be sure to save them. If the newspapers do not have five ads or more, look in the yellow pages to get the names of savings institutions to put on your survey form.

QUEST ACTIVITY

Watch television commercials or listen to radio commercials relating to savings accounts. Analyze them using the forms provided by your teacher.

SECTION II

SIMPLE INTEREST



SECTION II

Sally: "Hey Bob, wait up."

Bob: "Hey Sally, how's it going?"

Sally: "OK I guess. I did all of those activities you told me about."

Bob: "What do you think about interest now?"

Sally: "I think it's great but I want to know how much I can earn."

Bob: "Then you need to know the formula and how to use it for figuring interest."

Sally: "What is the formula?"

Bob: "i=prt"

Sally: "What does all that mean?"

Bob: "That means: Interest equals principal times rate times time or interest = principal x rate x time"

i=prt
i= interest earned
p= principal
r= rate of interest
t= time in years

Sally: "Fine, now can you explain those new words?"

Bob: "Sure thing. Interest is the amount your money can earn and principle is the money you have saved."

Sally: "Interest is the money (my money or principal) earns."

Bob: "Right. Rate is the interest rate or how fast your principal earns money."

Sally: "OK. What about time?"

Bob: "It is the time in years you have you principal in the account."

Sally: "That's a lot to understand. Give me an example."

Bob: "Look at the example on this page!"

EXAMPLE

Say you want to find the interest earned on $300 in a savings account for 5 years paying a 7% rate of interest.

OK, Sally, you would figure it like this:

i = (300) (.07) (5)

	300	principal
X	.07	rate
	21.00	
X	5	time
	105.00	

i = ? . . . What we want to know
p = $300 . . Amount saved
r = .07 . . .Rate in decimal form
t = 5 . . . Time in years

i = prt

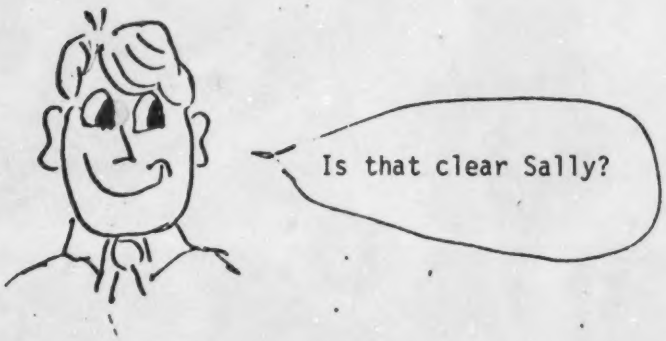
principal

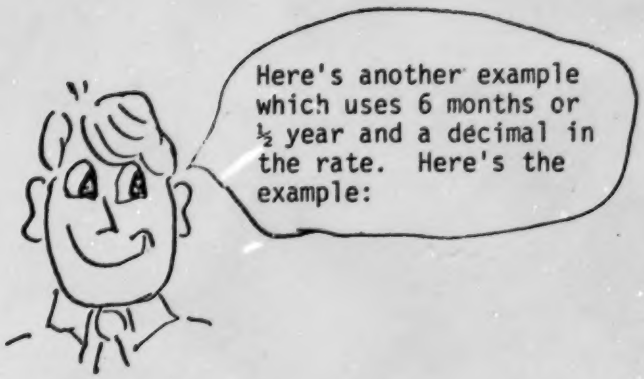
X rate

interest for one year

X time

total interest earned





EXAMPLE:

Find the interest earned on $750 in a savings account for 8 years 6 months at 4.6% interest. To figure this, you would:

i = (750) (.046) (8.5)

```
      750   principal
X     .046  rate
-----------
     4500
     3000
-----------
   34.500
X     8.5  time
-----------
   172500
   286000
-----------
  303.2500
```

i = ?

p = $750

r = .046

t = 8.5

i = prt

```
          principal
        X    rate
-----------------
-----------------
interest for one year
          X    time
-----------------
-----------------
total interest earned
```

 Now, did you understand that?

Sally: "Those don't seem too hard, Bob."

Bob: "No, they aren't. All you really need to do is multiply."

Sally: "I'd like to do a few."

Bob: "OK. Here are some in the following activities."

Work these activities with Sally!

ACTIVITIES

1. Work the problem on Worksheet 1 by filling in the blanks. Make sure the answer is correct by checking with your teacher.

2. Work the 5 problems on Worksheet 2. Show your work. When you are finished, hand in your worksheet to your teacher.

Bob: "You know, Sally, there's something else you might be be interested in."

Sally: "Oh yeah, what's that?"

Bob: "Well, about a month ago I was talking to a friend who had just earned $25 interest for the $625 she had in the bank. Her bank only paid interest once a year, but she didn't know the rate of interest."

Sally: "How do you figure out the interest rate?"

Bob: "I figured it out using the same formula, i = prt, but I solved the equation for "r" instead of "i". Here's how I did it:

EXAMPLE

Find the rate of interest if $25 is earned in one year on $625. Do it this way:	i = 25
	p = 625
	r = ?
	t = 1
	i = prt
$25 = (625)(r)(1)$	multiplication by 1
$25 = 625r$	
$\frac{25}{625} = \frac{625r}{625}$	dividing both sides by 625
$\frac{1}{25} = r$	reducing the fractions
$.04 = r$	dividing 1 by 25
$r = 4\%$	changing to per cent

Bob: "Now, if it was for two years instead of one you would have:

$25 = (625)(r)(2)$

$25 = 1250r$

$\frac{25}{1250} = \frac{1250r}{1250}$

$\frac{1}{50} = r$

$.02 = r$

$r = 2\%$

$t = 2$

$i = prt$

multiplying the principal by the time then solve as before

Sally: "Let me work a few like this."

Bob: "OK. Try these activities:"

ACTIVITIES

1. Solve the problems on Worksheet 3, showing your work. When you are finished, hand it in to your teacher to be checked.

2. Before you go on, see your teacher. There may be an additional activity to do.

Those were easy! I think I've got it!!

Sally: "Are there any other kinds of problems you can show me how to work?"

Bob: "Sure. Here are some that use variations of the formula $i = prt$."

Sally: "What do you mean?"

Bob: "Well, if you had money in two accounts, you would want to use something like $i = prt + prt$. Of course the p's, r's, and t's may be different so we want to write it like this:

$$i = p_1 r_1 t_1 + prt$$

Sally: "Are there any other variations?"

Bob: "Sure. For some, you will have to adjust the formula yourself. Sometimes we know how much interest is earned on a larger amount, but not on the given amount."

Sally: "Can you give me an example?"

Bob: "Sure. Here's one about Mrs. James on the next page."

Bob: "Would you like to work a few like those?"

Sally: "Sure."

Bob: "Do the following activities then."

Sally: "OK, you guys work them with me!"

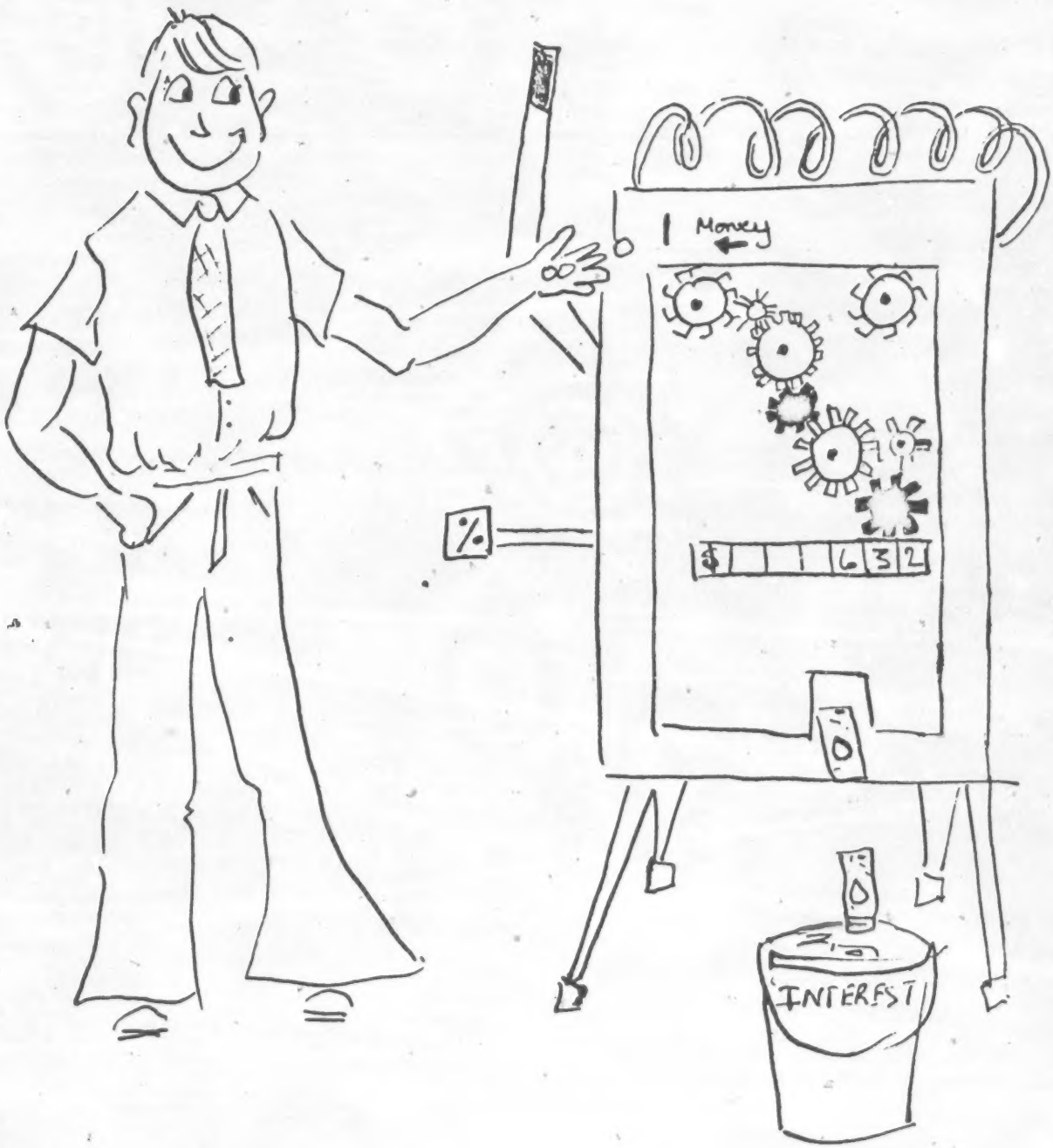
ACTIVITIES

1. Work the problems on Worksheet 4 showing your work. When you are finished, hand them in to your teacher to check.

2. Your teacher may direct you to work some more exercises. See you teacher before you go on!

SECTION III

COMPOUND INTEREST



Sam: "Sally and Bob are really getting into this interest thing. I don't know why. It seems dumb to me. Now they are wanting to learn about compound interest. Is interest more "interesting" than I thought?

Sally and Bob are going to learn about compound interest. Upon completion of this section Sally, Bob and you will be able to:

Objective: apply computation skills and the formula $A = P\left(1 + \frac{r}{n}\right)^{nt}$ find out the balance after interest is compounded.

SECTION III

Sally: "Bob, I read an ad in the newspaper that talked about compound interest. What is that?"

Bob: "Compound interest? I don't know."

Sally: "I thought you knew all about interest."

Bob: "I know about simple interest, but not about compound interest. How can we find out about compound interest?"

Sally: "I know. Let's go ask your banker tomorrow morning."

Bob: "Sounds good, I'll meet you at the bank."

Sally: "OK, see you tomorrow."

Bob: "Bye, see you at the bank, I'll introduce you to Mrs. Rockwell."

NEXT MORNING

Bob: "Sally, this is Mrs. Rockwell, the vice president of the bank."

Sally: "Glad to meet you Mrs. Rockwell. We would like to know something about compound interest."

Mrs. Rockwell: "I think I can give you a good example about compound interest." Let's turn the page and look at the example.

EXAMPLE

If you save $100 and keep it in your pocket, in five years you will have $100. If you put the $100 in a savings account paying 6% interest each year, you get a check at the end of each year for $6, at the end of 5 years you will have $100, but the money will earned $30 so you have received $6 a year for 5 years.

If you put the $100 in the savings account, but instead of taking the $6 out each year, you leave it in to earn interest for the remainder of the 5 years you have something like this:

First Year	$100 @ 6%	=	$6
Second Year	($100 + $6) @ 6%	=	$6.36
Third Year	($106 + $6.36) @ 6%	=	$6.74
Fourth Year	($112.36 + $6.74) @ 6%	=	$7.146
Fifth Year	($119.10 + $7.146) @ 6%	=	$7.575
Total Earned			$33.82

Reinvestment of the interest on your original deposit earned an extra $3.82. This principle is called compounding interest. The compounding period in this case was one year. Shorter compounding periods can earn even more money. For instance $100 invested for 5 years at 6% compounded monthly would earn $34.88.

If you were to figure this on a month to month basis, it could be done as the compounding yearly.

first month	$100	@ 6%	= .50	i = (100) (.06) (1/12)
second month	$100.50	@ 6%	= .50	i = (100.5)(.06) (1/12)
third month	$101	@ 6%	= .51	i = (101) (.06) (1/12)

etc, etc, etc...

Mrs. Rockwell: "Now if you would like to try a few, do the following activities:

1. Work the problems on Worksheet number 5. When you finish, give the worksheet to your teacher to be checked. Be sure to show your work as in the examples.

$ ¢ $ ¢ $ ¢ $ ¢ $ ¢ $ ¢ $ ¢ $

EXAMPLE

Mrs. James has money invested at 4% annual interest. If she adds $2000 more to the investment, the annual interest will be $260. How much did Mrs. James originally invest?

Original investment

$i = ?$

$p = ?$

$r = .04$

$t = 1$

It cannot be solved with two ?'s.

Adding $2000 we get:

$i = 260$

$p = x + 2000$

$r = .04$

$t = 1$

$i = prt$

$260 = (x + 2000)\ (.04)\ (1)$ multiplication on the right side

$260 = .04x + 80$

$260 - 80 = .04x + 80 - 80$ subtraction of 80

$180 = .04x$ simplifying

$\frac{180}{.04} = \frac{.04x}{.04}$ dividing by .04

$4500 = x$

Mrs. James had $4500 invested in the account originally.

Bob: "These seem to take a long time to work. Are there any short cuts?"

Mrs. Rockwell: "There is a formula to use for the problems. You can use it if the time is not too long. Otherwise the arithmetic gets too involved."

Sally: "What is the formula?"

Mrs. Rockwell: "$A = p(1 + \frac{r}{n})^{nt}$ where A is the amount of money in the account, p is the principal, r is the rate, t is the time in years, and n is the number of compounding periods in one year."

Bob: "Why won't it work for all compound interest problems?"

Mrs. Rockwell: "It will work for all of them. The problem is that if "nt" is very large, then you are taking a number to a very large power. That involves a lot of multiplication.

Sally: "Isn't there an easier way to do it?"

Mrs. Rockwell: "Yes. If you have a calcualtor with a y^x button, or if you know how to use logarithms."

Bob: "What are those?"

Mrs. Rockwell: "They are things your teacher will need to help you with when the time is right. Let's try some problems that do not have such large powers."

Bob: "Sounds OK."

Sally: "Can you show us an example?"

Mrs. Rockwell: "Yes, there's one on the next page."

EXAMPLE

Using the example we had before, saving $100 for five years compounding it yearly at 6% interest rate we get:

$$A = p(1 + \frac{r}{n})^{nt}$$

$$A = 100(1 = \frac{.06}{1})^{1 \cdot 5}$$

$$A = 100(1.06)^{5}$$

$$A = 100(1.3382)$$

$$i = A - p$$

$$i = 133.82 - 100$$

$$i = 33.82$$

p = 100

r = .06

n = 1 (compounded once a year)

t = 5

*NOTE: $33.82 was earned on the $100 in five years. $133.82 was in the account after five years.

Compounding this amount monthly got long and tedious the old way. With the new formula it became quite easy (if you have a calculator or know how to use logarithms).

$$A = p(1 + \frac{r}{n})^{nt}$$

$$A = 100(1 + \frac{.06}{12})^{(12)(5)}$$

$$A = 100(1.005)^{60}$$

$$A = 100(1.3488)$$

A = $134.88

A = $34.88

p = 100

r = .06

n = 12

t = 5

Mrs. Rockwell: "You can see that taking a number to the 60^{th} power could involve a great deal of multiplication. Why don't you try a few of these yourself. Do the following activities.

ACTIVITIES

1. Do the problems on Worksheet 6. Show your work. When you are fininshed, hand the worksheet in to your teacher.

Mrs. Rockwell: "You may want to do some more work with interest and savings accounts. If you would like to, do the following Quest Activity.

QUEST ACTIVITY

Now that you know how to figure interest, you will probably want to compare the earning power of your money at different savings institutions. For this purpose use only passbook accounts, or accounts where you can withdraw the money when you want (some you cannot).

In the newspaper or yellow pages find about three savings institutions (banks, savings & loan companies, credit unions) to compare. You might want to choose one that your family uses.

On the survey form provided in the work packet, write down the interest rate and the compounding period for their savings accounts. You can get this from a newspaper ad or information at your home, or call the place of business (do this while at home). Finish filling out the survey form and answer the questions asked.

POST-TEST

Now that you have finished the capsule, you need to take the Post-Test. Get your Post-Test from your teacher. When you successfully complete the Post-Test, you are finished with the capsule.

INTEREST,
It's really
a snap!